## Practice: 642 - Water Well

## Scenario: #1 - Large Diameter Drilled Well

### Scenario Description:

Typical construction is for the drilling of a well using a bucket well drill rig. These wells are large diameter drilled wells. The purpose of the practice is to provide water for livestock. An average well depth is less than 100 foot at 36" diameter. These wells are typically implemented in glacial till areas where the ground water resource has slow recharge rate, and the large diameter of the well allows for storage of water to meet the demand.

### Before Situation:

Livestock have insufficient water or are fenced from their water source.

### After Situation:

A 48 ft, 36" diameter well is installed using a bucket drill rig. The large diameter of the well allows for storage of water in glacial till areas where the groundwater recharge rate is less than demand. The well is dug and then cased with concrete. Perforated concrete casing is used as a screen around the bottom of the well. Approximately 6" of gravel is placed around the screen. Sufficient water is available for livestock.

Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** Depth of Well

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 48

**Scenario Cost:** $9,371.95 **Scenario Cost/Unit:** $195.25

### Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price ($/unit) | Quantity | Cost |
|---|---|---|---|---|---|---|
| ***Equipment/Installation*** | | | | | | |
| Bucket Drill Rig with operator | 2183 | Bucket drill rig including equipment and power unit costs and labor. | Hour | $539.58 | 10 | $5,395.80 |
| ***Labor*** | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | $20.32 | 8 | $162.56 |
| ***Materials*** | | | | | | |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | $25.33 | 4 | $101.32 |
| Chlorine | 1335 | Liquid chlorine bleach. Includes materials only. | Gallon | $2.79 | 5 | $13.95 |
| Well Casing, Concrete, perforated | 2174 | Perforated concrete tile 3' diameter x 8' long. Materials only. | Foot | $77.53 | 8 | $620.24 |
| Well Casing, Concrete | 2173 | Concrete tile 3' diameter x 8' long. Materials only. | Foot | $70.48 | 40 | $2,819.20 |
| ***Mobilization*** | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | $258.88 | 1 | $258.88 |

## Practice: 642 - Water Well

## Scenario: #2 - Shallow Drilled Well, ≤ 100 feet, ≤ 6in Diam

### Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 100 feet of the ground surface, and the flow is such that a smaller diameter well is sufficient. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock.

### Before Situation:

Livestock have insufficient water or are fenced from their water source.

### After Situation:

An average well depth is 100 feet. Well casings are ≤ 6" in diameter. Sufficient water is available for livestock.

Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** Depth of Well

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 100

**Scenario Cost:** $3,674.91 **Scenario Cost/Unit:** $36.75

### Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price ($/unit) | Quantity | Cost |
|---|---|---|---|---|---|---|
| ***Equipment/Installation*** | | | | | | |
| Rotary Drill Rig with Operator | 1595 | Rotary drill rig including equipment and power unit costs and labor. | Hour | $177.34 | 10 | $1,773.40 |
| ***Materials*** | | | | | | |
| Well Casing, Plastic, 6" | 1804 | PVC or ABS non-threaded well casing, 6". Materials only. | Foot | $6.46 | 70 | $452.20 |
| Well Cap, 6" | 1786 | Well cap, 6". Materials only. | Each | $33.29 | 1 | $33.29 |
| Chlorine | 1335 | Liquid chlorine bleach. Includes materials only. | Gallon | $2.79 | 1 | $2.79 |
| Grout, cement | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place. | Cubic Yard | $680.95 | 1 | $680.95 |
| Well Screen, plastic, 6" | 1999 | 6" PVC well screen. Materials only. | Foot | $15.78 | 30 | $473.40 |
| ***Mobilization*** | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | $258.88 | 1 | $258.88 |

## Practice: 642 - Water Well

## Scenario: #3 - Shallow Drilled Well, ≤ 100 feet, > 6in Diam

### Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 100 feet of the ground surface, and the flow is such that a larger diameter well is needed. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock.

### Before Situation:

Livestock have insufficient water or are fenced from their water source.

### After Situation:

An average well depth is 100 feet. Well casings are 12" in diameter. Sufficient water is available for livestock.

Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** Depth of Well

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 100

**Scenario Cost:** $4,742.97 **Scenario Cost/Unit:** $47.43

### Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price ($/unit) | Quantity | Cost |
|---|---|---|---|---|---|---|
| ***Equipment/Installation*** | | | | | | |
| Rotary Drill Rig with Operator | 1595 | Rotary drill rig including equipment and power unit costs and labor. | Hour | $177.34 | 10 | $1,773.40 |
| ***Materials*** | | | | | | |
| Grout, cement | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place. | Cubic Yard | $680.95 | 1 | $680.95 |
| Well Screen, plastic, 8" | 2000 | 8" PVC well screen. Materials only. | Foot | $24.81 | 30 | $744.30 |
| Chlorine | 1335 | Liquid chlorine bleach. Includes materials only. | Gallon | $2.79 | 1 | $2.79 |
| Well Casing, Plastic, 12" | 1807 | PVC or ABS non-threaded well casing, 12". Materials only. | Foot | $16.72 | 70 | $1,170.40 |
| Well Cap, 12" | 1789 | Well cap, 12". Materials only. | Each | $112.25 | 1 | $112.25 |
| ***Mobilization*** | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | $258.88 | 1 | $258.88 |

## Practice: 642 - Water Well

## Scenario: #4 - Deep Drilled Well, > 100 Feet

### Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur >100 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock.

### Before Situation:

Livestock have insufficient water or are fenced from their water source.

### After Situation:

An average well depth is 300 feet. Well casings are 4-6" in diameter. Well is dug into consolidated (bedrock or firm material) where casing and lining is installed to a depth of 240 feet. The remaining depth does not need lining or screening due to the "open hole" construction and nature of wells in this substrate. Sufficient water is available for livestock.

Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** Depth of Well

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 300

**Scenario Cost:** $8,594.47 **Scenario Cost/Unit:** $28.65

### Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price ($/unit) | Quantity | Cost |
|---|---|---|---|---|---|---|
| ***Equipment/Installation*** | | | | | | |
| Rotary Drill Rig with Operator | 1595 | Rotary drill rig including equipment and power unit costs and labor. | Hour | $177.34 | 24 | $4,256.16 |
| ***Materials*** | | | | | | |
| Well Casing, Metal, 6" | 1810 | Steel well casing, 6". Materials only. | Foot | $14.01 | 240 | $3,362.40 |
| Well Cap, 6" | 1786 | Well cap, 6". Materials only. | Each | $33.29 | 1 | $33.29 |
| Chlorine | 1335 | Liquid chlorine bleach. Includes materials only. | Gallon | $2.79 | 1 | $2.79 |
| Grout, cement | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place. | Cubic Yard | $680.95 | 1 | $680.95 |
| ***Mobilization*** | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | $258.88 | 1 | $258.88 |